

## CLAIMS

1. A vinyl polymer having a silanol group at one or more termini thereof.

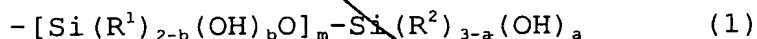
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2. The polymer according to Claim 1  
whose main chain is obtained by the polymerization of at least one monomer selected from the group consisting of (meth)acrylic monomers, acrylonitrile monomers, aromatic vinyl monomers, fluorine-containing vinyl monomers and silicon-containing vinyl monomers.

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3. The polymer according to Claim 1 or 2,  
wherein the silanol group is represented by the general  
formula (1):

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wherein  $\text{R}^1$  and  $\text{R}^2$  are the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms or an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by  $(\text{R}')_3\text{SiO}-$ , in which  $\text{R}'$  is a monovalent hydrocarbon group containing 1 to 20 carbon atoms and the three  $\text{R}'$  groups may be the same or different; when there are two or more  $\text{R}^1$  or  $\text{R}^2$  groups, they may be the same or different;  $a$  represents 0, 1, 2 or 3,  $b$  represents 0, 1 or 2, and  $m$  is an integer of 0 to 19, provided that the relation  $a + mb \geq 1$  should be satisfied.

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4. The polymer according to Claim 3,  
wherein, in general formula (1),  $m = 0$ .

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5. The polymer according to any of Claims 1 to 4  
which has a ratio ( $M_w/M_n$ ) of weight average molecular weight ( $M_w$ ) to number average molecular weight ( $M_n$ ) of less than 1.8 as determined by gel permeation chromatography.

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6. The polymer according to any of Claims 1 to 5, wherein the main chain is obtained by living radical polymerization.

5 7. The polymer according to Claim 6, wherein the living radical polymerization is carried out in the manner of atom transfer radical polymerization.

10 8. The polymer according to Claim 7, wherein a metal complex to be used as a catalyst for the atom transfer radical polymerization is a copper, nickel, ruthenium or iron complex.

15 9. The polymer according to Claim 8, wherein the catalyst for atom transfer radical polymerization is a copper complex.

20 10. The polymer according to any of Claims 1 to 9 which is obtainable by carrying out the hydrosilylation reaction of a vinyl polymer having an alkenyl group at one or more one termini thereof with a silicon compound having both a silicon atom-bound hydrolyzable group and a hydrosilyl group and then converting said hydrolyzable group to a silanol group by hydrolysis.

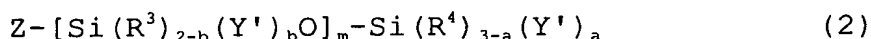
25 11. The polymer according to Claim 10, wherein the silicon compound having both a silicon atom-bound hydrolyzable group and a hydrosilyl group is chlorodimethylsilane.

30 12. A curable composition which comprises the vinyl polymer having a silanol group at one or more termini thereof according to any of Claims 1 to 11.

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13. The curable composition according to Claim 12 which comprises a silicon compound having two or more silicon atom-bound hydrolyzable groups.

5           14. The curable composition according to Claim 13, wherein the silicon compound having two or more silicon atom-bound hydrolyzable groups is represented by the following general formula (2):



10   wherein  $R^3$  and  $R^4$  are the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by  $(R')_3SiO-$ , in which  $R'$  is a monovalent hydrocarbon group  
 15   containing 1 to 20 carbon atoms and the three  $R'$  groups may be the same or different and, when there are two or more  $R^3$  or  $R^4$  groups, they may be the same or different,  $Y'$  represents a hydrolyzable group other than a hydroxyl group,  $Z$  represents an alkyl group containing 1 to 20 carbon atoms, an aryl group  
 20   containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms, a triorganosiloxy group represented by  $(R')_3SiO-$ , in which  $R'$  is as defined above, or a hydrolyzable group other than a hydroxyl group,  $a$  represents 0, 1, 2 or 3,  $b$  represents 0, 1 or 2 and  $m$  is an integer of 0 to 19 provided  
 25   that when  $Z$  is a hydrolyzable group, the relation  $a + mb \geq 1$  should be satisfied and, when  $Z$  is other than a hydrolyzable group, the relation  $a + mb \geq 2$  should be satisfied.

          15. The curable composition according to Claim 14,  
 30           wherein the hydrolyzable groups, namely  $Y'$  and  $Z$ , in general formula (2) are each selected from the group consisting of ketoximo, acyloxy, alkoxy, amido, aminoxy, amino and alkenoxy groups.

16. The curable composition according to any of Claims

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which comprises a polymer,  
said polymer having a silicon atom-bound hydrolyzable  
group(s) and no silanol group.

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17. The curable composition according to Claim 16,  
wherein the polymer having a silicon atom-bound  
hydrolyzable group(s) and no silanol group has a skeleton  
comprising at least one polymer selected from the group  
consisting of polysiloxane polymers, polyether polymers,  
10 hydrocarbon polymers and vinyl polymers.

18. The curable composition according to Claim 17,  
wherein the polymer having a silicon atom-bound  
15 hydrolyzable group(s) and no silanol group has a skeleton  
comprising at least one polymer selected from the group  
consisting of polyisobutylene, (meth)acrylic polymers and  
styrenic polymers.

19. A method of producing a vinyl polymer (II) having  
a hydrolyzable silyl group at one or more termini thereof  
which comprises reacting a vinyl polymer (I) having a  
silanol group at one or more termini thereof  
20 with a silicon compound having two or more silicon  
25 atom-bound hydrolyzable groups.

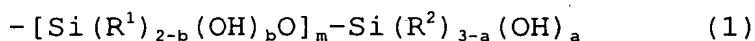
20. The method of producing according to Claim 19,  
wherein the vinyl polymer (I) has a main chain obtained  
by polymerizing at least one monomer selected from the group  
consisting of (meth)acrylic monomers, acrylonitrile monomers,  
30 aromatic vinyl monomers, fluorine-containing vinyl monomers  
and silicon-containing vinyl monomers.

21. The method of producing according to Claim 19 or 20,  
wherein the silanol group of the vinyl polymer (I) is

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represented by the general formula (1):



wherein R<sup>1</sup> and R<sup>2</sup> are the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms or an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by (R')<sub>3</sub>SiO-, in which R' is a monovalent hydrocarbon group containing 1 to 20 carbon atoms and the three R' groups may be the same or different; when there are two or more R<sup>1</sup> or R<sup>2</sup> groups, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, and m is an integer of 0 to 19, provided that the relation a + mb ≥ 1 should be satisfied.

22. The method of producing according to Claim 21, wherein, in general formula (1), m = 0.

23. The method of producing according to any of Claims 19 to 22, wherein the vinyl polymer (I) has a ratio (Mw/Mn) of weight average molecular weight (Mw) to number average molecular weight (Mn) of less than 1.8 as determined by gel permeation chromatography.

24. The method of producing according to any of Claims 19 to 23, wherein the vinyl polymer (I) has a main chain obtained by living radical polymerization.

25. The method of producing according to Claim 24, wherein the living radical polymerization is carried out in the manner of atom transfer radical polymerization.

26. The method of producing according to Claim 25, wherein a metal complex to be used as a catalyst for the atom transfer radical polymerization is a copper, nickel,

ruthenium or iron complex.

27. The method of producing according to Claim 26, wherein the catalyst for atom transfer radical polymerization is a copper complex.

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28. The method of producing according to any of Claims 19 to 27,

wherein the vinyl polymer (I) is obtainable by carrying out the hydrosilylation reaction of a vinyl polymer having an alkenyl group at one or more one termini thereof with a silicon compound having both a silicon atom-bound hydrolyzable group and a hydrosilyl group

and then converting said hydrolyzable group to a silanol group by hydrolysis.

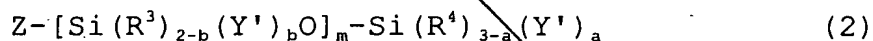
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29. The method of producing according to Claim 28, wherein the silicon compound having both a silicon atom-bound hydrolyzable group and a hydrosilyl group is chlorodimethylsilane.

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30. The method of producing according to any of Claims 19 to 29,

wherein the silicon compound having two or more silicon atom-bound hydrolyzable groups is represented by the general formula (2):



wherein  $R^3$  and  $R^4$  are the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by  $(R')_3SiO-$ , in which  $R'$  is a monovalent hydrocarbon group containing 1 to 20 carbon atoms and the three  $R'$  groups may be the same or different and, when there are two or more  $R^3$  or  $R^4$  groups, they may be the same or different,  $Y'$  represents a hydrolyzable group other than a hydroxyl group,  $Z$  represents

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an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms, an aralkyl group containing 7 to 20 carbon atoms, a triorganosiloxy group represented by  $(R')_3SiO-$ , in which  $R'$  is as defined above, or a hydrolyzable group other than a hydroxyl group, a represents 0, 1, 2 or 3, b represents 0, 1 or 2 and m is an integer of 0 to 19 provided that when Z is a hydrolyzable group, the relation  $a + mb \geq 1$  should be satisfied and, when Z is other than a hydrolyzable group, the relation  $a + mb \geq 2$  should be satisfied.

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31. The method of producing according to Claim 30, wherein the hydrolyzable groups, namely Y' and Z, in general formula (2) are each selected from the group consisting of ketoximo, acyloxy, alkoxy, amido, aminoxy, amino and alkenoxy groups.

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32. The method of producing according to Claim 30 or 31, wherein, in general formula (2),  $m = 0$ .

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33. A vinyl polymer having a hydrolyzable silyl group at one or more termini thereof and obtainable by the method of producing according to any of Claims 19 to 32.

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34. A curable composition which comprises the vinyl polymer having a hydrolyzable silyl group at one or more termini thereof according to Claim 33.

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35. A method of producing a vinyl polymer (III) having an acrylic functional group at one or more termini thereof which comprises reacting a vinyl polymer (I) having a silanol group at one or more termini thereof with a silicon compound represented by the general formula (3):

35  $XSiR_2-G-O-C(O)C(L)=CH_2 \quad (3)$

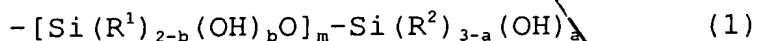
wherein R is a hydrocarbon group containing 1 to 14 carbon atoms or a halogenated hydrocarbon group containing 1 to 10 carbon atoms and the two R groups may be the same or different, X is a hydrolyzable group, G is an alkylene group containing 1 to 4 carbon atoms and L is a hydrogen atom or a hydrocarbon group containing 1 to 20 carbon atoms.

36. The method of producing according to Claim 35, wherein, in general formula (3), G is a group represented by  $-\text{CH}_2-$ ,  $-\text{CH}_2\text{CH}_2$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_2-$  or  $-\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2-$  and L is a hydrogen atom or a methyl group.

37. The method of producing according to Claim 35 or 36, wherein, the vinyl polymer (I) has a main chain obtained by polymerizing at least one monomer selected from the group consisting of (meth)acrylic monomers, acrylonitrile monomers, aromatic vinyl monomers, fluorine-containing vinyl monomers and silicon-containing vinyl monomers.

38. The method of producing according to any of Claims 35 to 37,

wherein the silanol group of the vinyl polymer (I) is represented by the general formula (1):



wherein  $\text{R}^1$  and  $\text{R}^2$  are the same or different and each represents an alkyl group containing 1 to 20 carbon atoms, an aryl group containing 6 to 20 carbon atoms or an aralkyl group containing 7 to 20 carbon atoms or a triorganosiloxy group represented by  $(\text{R}')_3\text{SiO}-$ , in which  $\text{R}'$  is a monovalent hydrocarbon group containing 1 to 20 carbon atoms and the three  $\text{R}'$  groups may be the same or different; when there are two or more  $\text{R}^1$  or  $\text{R}^2$  groups, they may be the same or different; a represents 0, 1, 2 or 3, b represents 0, 1 or 2, and m is an integer of 0 to 19, provided that the relation  $a + mb \geq 1$  should be satisfied.



39. The method of producing according to Claim 38, wherein, in general formula (1),  $m = 0$ .

508A<sub>12</sub> } 40. The method of producing according to any of Claims 35 to 39, wherein the vinyl polymer (I) has a main chain obtained by living radical polymerization.

10 41. The method of producing according to Claim 40, wherein the living radical polymerization is carried out in the manner of atom transfer radical polymerization.

15 42. The method of producing according to Claim 41, wherein a metal complex to be used as a catalyst for the atom transfer radical polymerization is a copper, nickel, ruthenium or iron complex.

20 43. The method of producing according to Claim 42, wherein the catalyst for atom transfer radical polymerization is a copper complex.

508A<sub>13</sub> } 44. The method of producing according to any of Claims 35 to 43, wherein the vinyl polymer (I) is obtainable by carrying out the hydrosilylation reaction of a vinyl polymer having an alkenyl group at one or more termini thereof with a silicon compound having both a silicon atom-bound hydrolyzable group and a hydrosilyl group and then converting said hydrolyzable group to a silanol group by hydrolysis.

35 45. The method of producing according to Claim 44, wherein the silicon compound having both a silicon atom-bound hydrolyzable group and a hydrosilyl group is chlorodimethylsilane.

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SUB A<sub>14</sub> 46. A vinyl polymer having an acrylic functional group at one or more termini thereof and obtainable by the method of producing according to any of Claims 35 to 45.

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47. The polymer according to Claim 46 which has a ratio (Mw/Mn) of weight average molecular weight (Mw) to number average molecular weight (Mn) of less than 1.8 as determined by gel permeation chromatography.

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SUB A<sub>15</sub> 48. A curable composition which comprises the vinyl polymer having an acrylic functional group at one or more termini thereof according to Claim 46 or 47.

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49. The curable composition according to Claim 48 which comprises a photopolymerization initiator so as to be cured by irradiation of light and/or electron beams.

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50. The curable composition according to Claim 49, wherein the photopolymerization initiator is a photo radical initiator.

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51. The curable composition according to Claim 49, wherein the photopolymerization initiator is a photo anion initiator.

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52. The curable composition according to Claim 48 which comprises a heat polymerization initiator so as to be cured by heating.

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SUB A<sub>16</sub> 53. The curable composition according to any of Claims 48 to 52 which comprises a radical-polymerizable group-containing monomer and/or oligomer.

54. The curable composition according to any of Claims 48 to 52

5 which comprises an anion-polymerizable group-containing monomer and/or oligomer.

55. The curable composition according to Claim 53 or 54, wherein the radical- or anion-polymerizable group is an acrylic functional group.

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